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The paper concludes with a general discussion of the experimental data, which may be summarized as follows:

The permeability and induction are always smaller for an alternating field than for a steady one, the difference reaching a maximum for low values of the magnetizing force, while near saturation the difference is small. For low values of the magnetizing force the differences are the same for all frequencies. The softer and less subdivided the iron, and the higher the frequency, the greater the difference (amounting in one case for very soft iron to 40%).

In moderate and strong fields, for equal values of the induction, the hysteresis is greater for alternating magnetization, than the value obtained by the usual static methods, the increase being greater the nearer saturation is approached, the higher the frequency and the softer the iron. The opposite is true for weak fields.

The only explanation which can be given is that the magnetism of the iron is unable to keep up with a rapidly varying field and consequently the hysteresis loop is broader and lower than it would be if determined for slow changes of the field.

A. ST. C. D.

#### GENERAL.

H. BECQUEREL (*Comptes Rendus*, t. CXXVII., p. 899 and t. CXXVIII., p. 145) has been able to prove and study the existence of abnormal dispersion in sodium vapor. He finds that the effects of the  $D_1$  and  $D_2$  lines in causing abnormal dispersion are superposed and that for certain rays the refractive indices are less than unity.

ON account of its importance in the theory of atmospheric electricity the question as to whether the vapor of an electrified liquid is itself electrified is of great interest. It cannot be said that the subject has not received attention, but the results obtained by different investigators are not in accord. Pellat (*Comptes Rendus*, t. CXXVIII., p. 169) has lately re-investigated the subject and finds that the rate of loss of charge from an insulated, electrified, metal vessel is greater when it contains water than when empty. Applying this result to the phenomena of atmospheric electricity he comes to the conclusion that it can

only explain a part of the observed facts and further knowledge will reveal some as yet unknown cause acting.

A. ST. C. D.

#### SCIENTIFIC NOTES AND NEWS.

MR. HENRY GANNETT, Geographer of the Geological Survey, who was the political and statistical geographer of the last census, has been asked to take charge of the same work for the coming census. The Director of the Census, Mr. Merriam, has announced that all applications for positions will receive consideration, and that examinations will be held as rigid as those before the Civil Service Commission. The 300 Supervisors are to be appointed after consultation with Senators and Representatives of the separate States, but without regard to party affiliations.

THE professors of geology in the University of California and in Stanford University have organized a geological club, to be called the 'Cordilleran Geological Club.' It is intended to include all the geologists of the Pacific and adjacent States, and its object is by occasional meetings to stimulate geological work. Whether it shall remain an independent organization or shall be affiliated with any other scientific body is left for future decision.

PROFESSOR RAY LANKESTER has been elected Foreign Correspondent of the Paris Academy of Sciences for the Section of Anatomy and Zoology. Twenty-seven votes were cast for Professor Lankester and eight for Professor Van Beneden, of Liège. M. Lortet, professor of medicine, of Lyons, has been elected National Correspondent for the same Section.

LORD LISTER, London, and Professor Koch, Berlin, have been elected Foreign Associates of the Paris Academy of Medicine.

PROFESSOR RAY LANKESTER, London; Professor L. Cremona, Rome, and M. Alexander Karpinsky, St. Petersburg, have been elected Associates of the Belgian Academy of Sciences.

THE address in medicine at the next Yale commencement exercises is to be delivered by Professor Charles Sedgwick Minot, of the Harvard Medical School. The title of the address has not yet been announced, but we are in-

formed that Dr. Minot will present some new aspects of medical education.

PROFESSOR GEORGE T. LADD, of Yale University, will be given a year's leave of absence at the close of the present academic year, and will lecture on philosophical subjects before the Universities of Japan and India.

DR. WILLIAM T. HARRIS, United States Commissioner of Education, has been given an honorary doctorate of philosophy by the University of Jena.

MR. W. E. D. SCOTT has been appointed curator of the ornithological collection in the School of Science of Princeton University.

MR. A. E. BOSTWICK, Librarian of the New York Free Circulating Library, has been elected Librarian of the Brooklyn Public Library.

THE Permanent Secretary of the American Association for the Advancement of Science, Dr. L. O. Howard, Department of Agriculture, Washington, D. C., would be glad to receive information of the present addresses of the following: Mr. William J. Lewis, Mr. Frank McClintock, Miss Mary A. Nichols, Mr. Charles M. Rolker and Mr. Carl H. Schultz.

SIGNOR RODOLFO LANCIANI, D.C.L., LL.D., professor of ancient topography in the University of Rome and Director of the Italian School of Archæology, has been appointed Gifford lecturer in the University of St. Andrews for the next two academical years. The subject of his lectures will be the 'Religion of Rome.'

WE learn from *Nature* that at the anniversary meeting of the Royal Astronomical Society, Mr. Frank McClean, F.R.S., was awarded the gold medal of the Society for his photographic survey of stars in both hemispheres, and other contributions to the advancement of astronomy. A prize of 500 francs, founded by Augustin-Pyramus de Candolle for the best monograph on a genus or family of plants, is offered in competition by the Société de physique et d'histoire naturelle de Genève. The monographs may be composed in Latin, French, German, Italian or English, and must be sent to M. Pictet, the President of the Society, before January 15, 1900. Members of the Society

are not permitted to compete. The Belgian Royal Academy has awarded prizes of 600 francs to M. Georges Clautriau, of Brussels, for his memoir, on the macro- and micro-chemistry of digestion in carnivorous plants, and to Professor L. Cuénot, of Nancy, for his essay on the excretory organs of Mollusca.

WE regret to record the death of Sir Douglas Galton, F.R.S., the eminent sanitary engineer. Born in 1822, he was educated at Rugby and Woolwich, and received a commission in the Royal Engineers in 1840. He subsequently served in many important capacities as Inspector of Public Works, visiting the United States to inspect the railways in 1856. He was the author of books on 'Healthy Dwellings' and 'Healthy Hospitals.' Sir Douglas Galton was for twenty-five years the General Secretary of the British Association, and on his retirement, in 1895, was elected President. It will be remembered that his presidential address at Ipswich was published in this JOURNAL.

SIR JOHN STRUTHERS, emeritus professor of anatomy in the University of Aberdeen, died on February 24th, aged 75 years. He was the author of numerous papers on human and comparative anatomy, and exercised much influence on the improvement of anatomical teaching in Scotland.

THE deaths are also announced of Dr. Dareste de la Chavanne, the French anthropologist, and Dr. Franz Lang, a Swiss zoologist and geologist.

A GRANT of £300 from the Worts Travelling Scholars' Fund, Cambridge University, has been made to Mr. W. W. Skeat, M.A., towards defraying the expenses of his scientific expedition to the Malay peninsula, on the condition that the results of the investigations made by the expedition be reported by him to the Vice-Chancellor in a form that may hereafter be published. Mr. Skeat is accompanied by two zoologists, Messrs. Evans and Annandale, of Oxford, and by Mr. Gwynne-Vaughan, botanist.

NEWS of the safety of M. Bonin, the French explorer, who has been missing in Thibet and the interior of China, has reached Shanghai. He arrived at Yachow, Sye Chuen district, after many exciting experiences, and will make his

way to the coast by the river route. With a few Chinese companions he has travelled through the greater portion of Thibet and made a trip from the Siberian line to Tong King.

STEPS have been taken by the British government to guard against undue destruction of wild animals in Africa, by the issue of game regulations. The German government has been consulted, and it is proposed to hold an international conference on the subject in London in the spring.

THE New York Post-Graduate Hospital has received \$100,000 from Mr. Harris Fahenstock for a training school for nurses.

PROFESSOR R. W. WOOD, of the University of Wisconsin, has discovered a new method of photographing in natural colors. He reproduces the colors by diffraction, and, though at present the production of the first finished picture is somewhat tedious, duplicates can be printed as easily as ordinary photographs are made. The pictures are on glass, and are not only colorless, but almost invisible when viewed in ordinary lights, but when placed in a viewing apparatus, consisting of a convex lens on a light frame, show the colors of nature with great brilliancy. The principle is that the picture and the lens form spectra which overlap and the eye placed in the overlapping portion sees the different portions of the picture in color depending on the distance between the grating lines at that place. Professor Wood says the finished picture is a transparent film of gelatine with very fine lines on it, about 2,000 to the inch on the average. The colors depend solely on the spacing between the lines, and are pure spectrum colors, or mixtures of such, the necessity of colored screens or pigments, used in all other processes except that of Lippman, having been overcome. The pictures can be projected on a screen by employing a suitable lantern, or can be viewed individually with a very simple piece of apparatus consisting of a lens and perforated screen mounted on a frame. A peculiarity of the process is that there is no such thing as a negative in it. Half-a-dozen pictures have been printed in succession, one from another, and all are positive and indistinguishable from each other.

THE record for kite-flying for scientific purposes has again been broken at the Blue Hill Observatory; 12,440 feet above the sea-level was reached on February 28th by a recording instrument attached to a string of tandem kites. This is 366 feet higher than the preceding best record, made at the same place on August 26th. The flight was begun at 3:40 p. m., Tuesday, the temperature at the surface being 40° and the wind seventeen miles an hour. At the highest degree the temperature was 12° and the wind velocity fifty miles an hour. Steel wire was used as a flying line, and the kites, four in number, were of an improved Hargreave pattern, with curved surfaces, made after the pattern of soaring birds' wings. The upper kite carried an aluminum instrument weighing four pounds, which recorded graphically temperature, wind velocity, humidity and atmospheric pressure. The combined kites had an area of 205 square feet and weighed twenty-six pounds, while the weight of the wire was seventy-six pounds. The upper kite remained above two miles for about three hours, and was reeled in by a steam windlass, constructed for that purpose. When within half a mile of the ground the fastening on one of the kites slipped, and this carried it up to the one above, the added pull snapping the wire and sending three kites adrift. A search for the lost kites was begun on Wednesday, and two of them were found at the Milton town farm, about two miles away, but the third was not recovered until later, when it was found at Field's Corner, over six miles north of the Observatory, or more than half the distance between that point and the State House. The recording instrument was found uninjured. This was the last of a series of five high flights made on successive days, Sunday excepted. The average height reached was 10,300 feet, or nearly two miles. The temperature at 10,000 feet on February 23d was 5°; on the 24th, 1°; on the 25th, 11°, and on the 28th, 20° above zero.

THE *British Iron Trade Journal* attributes the remarkable expansion of the iron and steel industries of the United States to the following favorable changes in economic conditions: (a) 'Intensive' production, reducing costs generally; (b) Reduced costs of ores and develop-

ment of the deposits of fine mineral in the district adjacent to the Great Lakes; (c) Reduction of salaries through technical progress and changes in systems of administration; (d) Remarkably low cost of fuel; (e) Concentration of production with unlimited capital; (f) Mainly, however, to reduced cost of transportation. This last factor more than all others together has brought about this great change and placed the United States in its present relation to the world's markets.

IN a note by M. Considère, published in the *Moniteur Industrielle*, recently, there are given the data of tests of mortars and cements in structures, their resistance being reinforced by the introduction of iron straps and 'armatures,' which show that, as he states, these substances may be thus caused to sustain tensions twenty times as great as when not thus reinforced.

It appears that the Nernst light, the scientific principles of which we recently described, is likely to rival the arc lamp for general use. Companies have been organized in Germany, Great Britain and America with capitals extending into the millions of dollars. The English company values its rights at about \$1,300,000, and it is to be hoped that Professor Nernst receives the greater part of this sum.

*Knowledge* states that a site has been secured at Kemp Town, overlooking Queen's Park, Brighton, for the Gardens of the recently founded Zoological Society for Brighton and Hove. Some sixty years ago Brighton possessed a small zoological garden situated north of The Level, on the Lewes Road. The institution did not flourish owing to the ignorance of its originators, who had no notion of the proper method of dealing with captive specimens. The consequence was a very high death-rate and a brief career for the institution. The new garden will not be likely to fail from the causes which produced the collapse of its predecessor, for it will be managed by competent zoologists who have experience in the treatment of animals of all kinds. Moreover, the encouragement held out to the projectors by residents and persons of distinction in Brighton is such as to warrant us in believing that the undertaking

will prove to be a success in all respects. A special feature in the new institution will be the regular delivery of courses of instructive popular lectures for the benefit of the numerous schools in Brighton and Hove. Among those who have enrolled their names as patrons of the Society are several of the foreign Ambassadors, the Duke of Fife, Sir John Lubbock, Sir Edward Sassoon, the Earl of Chichester and the Hon. Walter Rothschild. The managing-directors are the Earl of Landaff and Mr. F. W. Frohawk.

THE New York *Medical Record* states that the Japanese parliament has passed a bill authorizing the free distribution of vaccine virus and rendering vaccination compulsory. It is provided that a child must be vaccinated within ten month of its birth, and that, if the vaccination does not take, it must be repeated within a period of six months, and yet again within a similar period if it be again unsuccessful. Further, all children must be re-vaccinated at the age of six and once more at the age of twelve. Thereafter vaccination becomes occasional, and may be declared compulsory at any time of threatened or actual epidemic, the power to order it being vested in local governors.

A COURSE of nine lectures upon science and travel has been arranged by the Field Columbian Museum, Chicago, for Saturday afternoons in March and April at 3 o'clock. The lectures are as follows:

March 4—'Cuba and the Cubans,' Dr. R. S. Martin, Chicago.

March 11—'Blind Fishes of North American Caves,' Dr. Carl H. Eigenmann, Director, Biological Station, Bloomington, Indiana.

March 18—'Religious Ceremonies of the Hopi Indians of Arizona,' Dr. George A. Dorsey, Curator, Department of Anthropology, Field Columbian Museum.

March 25—'Colors of Flowers and Fruits,' Professor W. H. Dudley, Wisconsin State Normal School.

April 1—'Russia and the Russians,' Professor A. M. Feldman, Armour Institute of Technology.

April 8—'The Bad Lands of South Dakota,' Professor O. C. Farrington, Curator, Department of Geology, Field Columbian Museum.

April 15—'Extinct Vertebrates of the Bad Lands,'

Mr. E. S. Riggs, Assistant Curator of Paleontology, Field Columbian Museum.

April 22—'Animal Messmates and Parasites,' Professor H. M. Kelly, Cornell College, Mount Vernon, Iowa.

April 29—'Aboriginal Methods of Manufacturing Weapons and Implements,' Professor George L. Collie, Beloit College, Wisconsin.

#### UNIVERSITY AND EDUCATIONAL NEWS.

MR. W. F. R. WELDEN, F.R.S., professor of zoology of University College, London, has been elected Linacre professor of comparative anatomy at Oxford, in succession to Professor Ray Lankester. Professor Welden, Professor Love, whose appointment to the Sedleian chair of natural philosophy we announced last week, and Mr. Stout, recently appointed to the Wilde lectureship of mental philosophy, were all Fellows of St. Johns College, Cambridge.

THE following promotions have been made at Princeton University: Assistant Professor Herbert S. S. Smith to be professor of applied mechanics in the School of Science; Assistant Professor Walter Butler Harris to be professor of geodesy in the School of Science, and Instructor Ulric Dahlgren to be assistant professor of histology in the academic department.

E. L. THORNDIKE, PH.D. (Columbia), instructor in Western Reserve University, has been appointed instructor in genetic psychology in Teachers College, Columbia University.

THE Isaac Newton Scholarship of Cambridge University for the encouragement of study and research in astronomy has been awarded to Mr. G. W. Walker, B. A. Scholar of Trinity College. The scholarship is of the annual value of £200, and is tenable for three years.

MISS CAROLINE HAZARD, of Peacedale, R. I., has been elected President of Wellesley College.

PROFESSOR SNELLEN will retire at the close of the present semester from the chair of ophthalmology at the University of Utrecht.

At a recent meeting of the Council of New York University Chancellor MacCracken reported that endowments amounting to nearly \$50,000 had been received, of which \$20,000

will be devoted to the School of Applied Science.

A CHAIR of English Literature has been endowed in Princeton University with \$100,000, on condition that the Rev. Dr. Henry Van Dyke, of New York City, be the first incumbent. Princeton University has also received \$65,000 for the academic department.

THE German-American citizens of New York are collecting a fund of \$20,000 in honor of Mr. Carl Schurz, whose seventieth birthday was recently celebrated. The money will be used to endow a fellowship and a Library of Germanic Literature in Columbia University.

THE following further gifts have been made during the week to educational institutions: \$50,000 to the Catholic University by the National Council, Knights of Columbus, to establish a chair for historical research; \$20,000 to Hobart College for the foundation of scholarships by Miss Catherine L. Tuttle; \$10,000 to University of Virginia for books on the history of Virginia, and \$5,000 from various donors to Syracuse University.

AT congregation at Cambridge University on March 2d the report of the General Board of Studies recommending the establishment of a department of agriculture in the University under the direction of a professor was approved. The offers made to the University by Sir Walter Gilbey, the Board of Agriculture, certain county and borough councils and the Drapers' Company were gratefully accepted.

THE plans for the Cornell Medical School, New York City, have been filed. The entire frontage on First avenue, between Twenty-seventh and Twenty-eighth streets, is to be occupied by the building, which will cost \$500,000.

*Erratum:* In the abstract (p. 312 above) of Professor Wm. A. Locy's paper before the American Morphological Society, 'New Facts Regarding the Development of the Olfactory Nerve,' the first sentence should read: 'The early embryonic history of the olfactory nerve is very imperfectly known,' instead of 'is known,' and the closing sentence should read: 'It was also shown to persist in the adult,' instead of 'to perish in the adult.' Credit should also be given to the Elizabeth Thompson Science Fund for providing the material upon which the research was conducted.